

PROJECT facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
FEDERAL ENERGY TECHNOLOGY CENTER

ADVANCED CLEAN/EFFICIENT
POWER systems

PS028.0798M

WILSONVILLE POWER SYSTEMS DEVELOPMENT FACILITY

Project Description

The Wilsonville Power Systems Development Facility (PSDF) is the focal point for much of the Nation's advanced electric power technology development in the latter 1990s and into the 21st century.

Jointly sponsored by many of the Nation's most forward-looking power equipment developers, the facility is a highly flexible test center. Private developers are able to test innovative electric power system components — new combustors, improved cleanup systems, and advanced turbines and fuel cells — at a central location, saving the time and expense of building separate test facilities.

The facility contains four technologies: (1) an advanced pressurized fluidized-bed combustor (PFBC) system (an extremely clean method for burning coal), (2) a transport reactor gas source (an efficient type of coal gasifier/combustor), (3) particulate control devices (PCDs) (to test filters for removing tiny particles from coal gases), and (4) an advanced topping combustor/gas turbine. An advanced fuel cell may be added in the future.

Combining these technologies into a single structure saves more than \$32 million compared with the cost of building stand-alone facilities.

Status

The Kellogg transport reactor was successfully operated on coal in August 1996. Tests are currently underway in pressurized combustion mode prior to conversion to gasification. Particulate removal to date has been with the Westinghouse filter vessel using a variety of candle filters. Construction of the advanced Foster Wheeler PFBC is complete and shakedown testing has begun.

Program Goal

DOE's goal is to develop power systems that are much more efficient and at least 10 times cleaner than today's standards by the year 2010. The Wilsonville PSDF will serve as the proving ground for many new Advanced Power Systems and Vision 21 Technologies. The goal of the Wilsonville PSDF is to perform integrated system and component testing in an industrially relevant scale of operation via a government/industry partnership.

PRIMARY PROJECT PARTNERS

Southern Company Services
Birmingham, AL

MAIN SITE

**Wilsonville Power Systems
Development Facility**
Wilsonville, AL

TOTAL ESTIMATED COST

\$272,000,000

COST SHARING

DOE \$229,000,000

Non-DOE \$43,000,000



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Project Benefits

The Wilsonville Power Systems Development Facility gives U.S. industry the world's most cost-effective, flexible test center for testing tomorrow's coal-based power-generating equipment. It is one of the highest priorities in the Department of Energy's advanced power systems development effort.

Coal will supply at least half the Nation's electricity well into the 21st century (it currently accounts for 56%). Yet, future coal systems will have to be increasingly clean and more efficient if the United States is to use its most abundant fossil fuel to sustain economic growth.

The Power Systems Development Facility is designed to be the Nation's test center for evaluating the critical components of these future, coal-based power systems. For example, at the facility:

- The transport reactor will test advanced, high-efficiency gasification and combustion methods which should lead to less CO₂ and other pollutant emissions per pound of coal burned.
- The pressurized fluidized-bed combustor will test a new, higher efficiency method for burning coal that reduces sulfur and nitrogen emissions inside the boiler, eliminating the need for expensive post-combustion controls for these pollutants.
- The particulate control module will test a variety of filters developed by private firms for removing particles so as to reduce emissions and prevent damage to downstream power equipment. Such filters will be crucial to future coal-based, high-efficiency power plants.
- The fuel cell and advanced turbine will test advanced versions of these technologies so that developers can evaluate their performance in a power plant environment.

Hardware systems can first be evaluated separately, then linked together in an integrated power system. Filters can be tested with a pressurized fluidized-bed combustor or with a coal gasifier. Advanced turbines and fuel cells can be tied into the process path.

The result is a national test center where utilities and other members of the power industry can evaluate new concepts for advanced power plants. Capable of operating at pilot to near-demonstration scales, the facility is large enough to give industry real-life data, yet small enough to be cost-effective and adaptable to a variety of industry needs.



CONTACT POINTS

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Project Partners

M.W. KELLOGG, INC.

Houston, TX
(transport reactor)

FOSTER WHEELER DEVELOPMENT CORPORATION

Perryville, NJ
(advanced PFBC)

SOUTHERN RESEARCH INSTITUTE

Birmingham, AL
(particulate sampling)

WESTINGHOUSE ELECTRIC CORPORATION

Orlando, FL
(low NO_x topping combustor)

WESTINGHOUSE SCIENCE AND TECHNOLOGY CENTER

Pittsburgh, PA
(particulate filters)

COMBUSTION POWER CORPORATION

Menlo Park, CA
(particulate filters)

ALLISON GAS TURBINES

Indianapolis, IN
(gas turbines)

PEABODY COAL COMPANY

St. Louis, MO
(cofunding)